

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 November 2002 (14.11.2002)

PCT

(10) International Publication Number
WO 02/091325 A1

(51) International Patent Classification⁷: G08B 25/10

(74) Agents: ONSAGERS AS et al.; P.O. Box 265 Sentrum,
N-0103 OSLO (NO).

(21) International Application Number: PCT/NO02/00147

(22) International Filing Date: 19 April 2002 (19.04.2002)

(25) Filing Language: Norwegian

(26) Publication Language: English

(30) Priority Data:
20012019 24 April 2001 (24.04.2001) NO

(71) Applicant (for all designated States except US): ELEC-
TRONIC TARGET SYSTEM AS [NO/NO]; Havsjørn.
9, N-3260 LARVIK (NO).

(72) Inventors; and

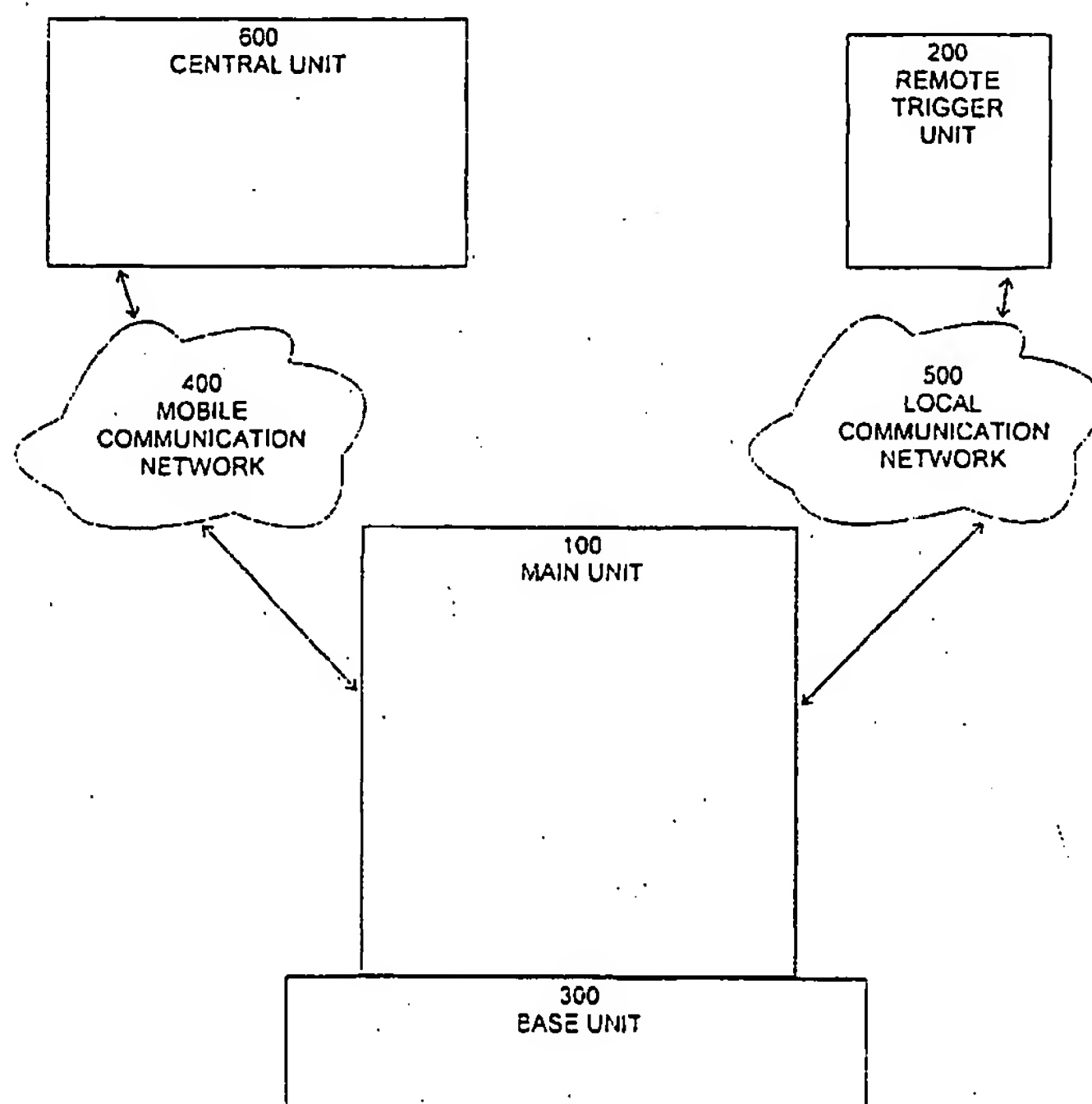
(75) Inventors/Applicants (for US only): GERNER, Henrik
[NO/NO]; Kongegt. 17, N-3256 LARVIK (NO). EN-
GEBRETSEN, Tor [NO/NO]; Vindlyveien 47, N-3260
LARVIK (NO).

(81) Designated States (*national*): AE, AG, AL, AM, AT (util-
ity model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA,
CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (util-
ity model), DE, DK (utility model), DK, DM, DZ, EC, EE
(utility model), EE, ES, FI (utility model), FI, GB, GD, GE,
GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ,
LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,
MW, MX, MZ, NO, NZ, OM, PH, PI, PT, RO, RU, SD,
SE, SG, SI, SK (utility model), SK, SL, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,
GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent
(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,
NE, SN, TD, TG).

[Continued on next page]

(54) Title: SECURITY ALARM



(57) Abstract: The invention relates to a main unit (100) for a security alarm for establishing communication between a user of the security alarm and an external central unit (600) linked to a mobile communication network (400). The main unit comprises a processing unit (110), connected to an audio unit (160) for inputting and emitting voice signals, an activation device (120) and a mobile communication unit (130), arranged, on operation of the activation device, to initiate an alarm situation, including establishing a two-way communication connection between the main unit (100) and the external central unit (600). The main unit can be configured and controlled from the central unit (600) in a simple and practical manner. This is achieved by the processing unit (110) being arranged to keep stored in a memory configuration data indicating the connection between the conditions for an alarm situation to be considered to have arisen, and the actions that should be performed in the event of an alarm situation. The processing unit is further arranged to receive a digital message from the mobile communication network (400) via the mobile communication unit (130), and on the basis

of the digital message to modify the stored configuration data.

WO 02/091325 A1



Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv)) for US only

— entirely in electronic form (except for this front page) and available upon request from the International Bureau

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Security alarm

Technical field

The invention relates generally to alarm systems, and in particular wireless and mobile security alarms or personal alarms for use by people who need to be able to give a warning about a critical situation.

In particular, the invention relates to a main unit for a security alarm for establishing communication between a user of the security alarm and an external central unit linked to a mobile communication network. The main unit comprises a processing unit, connected to an audio unit for inputting and emitting voice signals, an activation device and a mobile communication unit, arranged, on operation of the activation device, to establish a two-way communication connection between the main unit and the external central unit.

The invention also relates to a security alarm comprising such a main unit and a remote trigger unit that communicates wirelessly with the main unit.

Background of the invention

There is an increasing need for technical solutions and equipment that offer security to individuals who need to be able to give a warning about a critical situation, such as elderly and handicapped people, those who are at risk of violence, or people in hazardous occupations such as watchmen, taxi drivers and others. In particular, there is an increasing need for equipment of a type that can operate independently of a stationary base, and where it is possible to localise the person concerned after an alarm has been activated.

The state of the art

*Personal
panic
button*

From US-6 044 257 a personal alarm device is known for establishing mobile communication between a user of the alarm device and an alarm centre linked to a mobile communication network. The device comprises a processing unit connected to a microphone and a loudspeaker for inputting and emitting voice signals respectively, and activation device and a mobile communication unit arranged, on operation of the activation device, to establish a two-way communication connection between the main unit and the alarm centre.

A disadvantage of this prior art device is that it cannot be remotely configured from an external unit, and particularly not from the alarm centre.

A second disadvantage of the known device is that its function cannot be influenced by commands transmitted from an external unit, particularly not from the alarm centre.

A further disadvantage of the known device is that it comprises such a large number of components that on account of its volume and weight it is too large to be suitable to be worn, e.g., on a chain round the neck.

Summary of the invention

According to a first aspect of the invention it is an object to provide a main unit for a security alarm as mentioned in the introduction, which in a simple and practical manner can be configured or programmed from a central or mobile unit at a distance from the place in which the security alarm is located.

A second object is to ensure that the main unit can only be configured from one or a number of predetermined central or mobile units.

A further object is to provide a main unit for a security alarm, which can be localised both by means of existing positioning functions in the mobile telephone network and by means of remotely activated radio direction-finding.

An additional object is to provide a security alarm, which in a simple and practical manner can be adapted to the needs of different users.

According to a second aspect of the invention it is an object to provide a security alarm, which comprises a main unit and a cordless remote trigger means of minimum physical dimensions, which overcomes the said drawbacks.

The above objects and other advantages are achieved by means of the features that will be apparent in the following patent claims.

Brief description of the drawings

The invention will now be described in greater detail in the form of a preferred embodiment with reference to the drawings, in which:

Fig. 1 is a block diagram of a system in which the invention is included.

Fig. 2 is a block diagram of the principle construction of a main unit.

Fig. 3 is a block diagram of the principle construction of a remote trigger unit.

Fig. 4 is a block diagram of the principle construction of a base unit.

Detailed description of the invention.

Fig. 1 illustrates a block diagram of a system in which the invention is included.

The security alarm comprises a main unit 100 and a remote trigger unit 200.

The user of the security alarm wears the remote trigger means 200, also called an "accessory", which is preferably designed to be worn on a cord round the neck or the wrist, so as to be easily accessible at all times for operation. The remote trigger unit is equipped in such a way that it can easily be activated by the user if a critical, external situation arises. The remote trigger unit is arranged for cordless communication with a main unit 100 through a local communication network 500. In a preferred embodiment radio communication as specified by the Bluetooth standard is employed for this communication.

A basic task of the remote trigger means 200 is to transmit a signal to the main unit 100 through the local communication network 500.

The main unit 100 is releasably placed in a base unit 300. The base unit 300 may supply the main unit with electric power, and in addition it contains a loudspeaker for playback of sound signals generated in the main unit.

The main unit 100 is arranged for cordless communication with the remote trigger means 200 through the local communication network 500. As mentioned above, for this communication use is preferably made of radio communication as specified by the Bluetooth standard.

The main unit 100 is further arranged for mobile communication with an external central unit 600 through a mobile communication network 400, such as a GSM network. For this purpose the main unit comprises a mobile telephone module, such as a GSM module. In particular, the main unit 100 is

arranged to be able to exchange two-way digital messages with the central unit 600 by means of available services offered in the network 400, such as SMS (short message service) messages. The network 400 will also normally be able to offer services for transferring A-number information, i.e. data identifying the calling party are transferred by means of the call. The network 400 will also normally be able to offer services for determining geographical position data for a mobile terminal operating in the network. This permits position data for the main unit 100 to be provided by these services and received by the external central unit 600 from the network 400. The actual generation of such position data is not covered by the invention, and will therefore not be discussed further here.

Fig. 2 illustrates a block diagram for the principle construction of a main unit 100. Centrally situated in the main unit is a processing unit 110 in the form of a microcontroller.

The microcontroller 110 comprises a microprocessor, a memory and input/output circuits. The memory comprises a program memory for storing fixed or pre-programmed program parts and fixed or prestored data. The program memory may be composed of a read-only memory (ROM), but it is specially preferred for some program parts or all program parts to be stored in a Flash memory, which can be overwritten several times. This permits these program parts to be replaced, either by transfer via the mobile network 400 or via the local network 500. The memory further comprises a random access memory (RAM) for storing volatile or temporary data and a semi-volatile memory such as an electrically erasable, programmable memory (EEPROM) for storing temporary data that have to be maintained even though the main unit is switched off.

The microcontroller 110 may be a standard electronic component, which can be chosen by those skilled in the art, but program code contained in the program memory, and thereby the mode of operation of the microcontroller, will be characteristic of the invention.

The microcontroller 110 is connected to a mobile communication unit 130, which provides two-way communication between the microcontroller 110 and external units connected to a mobile communication network 400. The communication unit 130 is preferably composed of a GSM mobile telephone module, arranged for transferring both voice and digital messages, usually

SMS messages. In addition, on receiving a call from the unit, the communication unit 130 is arranged to retrieve from the mobile network 400 identification data identifying the party who is calling.

The microcontroller 110 is further connected to a local communication unit 140 in the form of a radio transceiver that is suitable for transmitting and receiving data within a limited area, normally within a range of up to 100 m. The local communication unit 140 is preferably a transceiver module based on the Bluetooth specification. Bluetooth specifies a radio technology for cordless communication over a limited area, and employs the 2.4 – 2.5 GHz band. Further information on the Bluetooth specification is available on www.bluetooth.com.

The microcontroller 110 is further connected to a direction-finding unit 150. The direction-finding unit 150 comprises a radio transmitter, and is arranged to transmit a pulsed signal on a more closely specified carrier wave, which is suitable for direction-finding purposes. The direction-finding transmitter, moreover, can transmit a signal modulated by digital or analog modulation in order to identify the sender and/or facilitate the direction-finding. The direction-finding transmitter can be placed in power saving mode between each transmitted pulse or pulse train, in order to reduce the energy consumption and thereby extend the life of the battery. The microcontroller 110 is arranged to deliver the signal that has to be modulated by the transmitter, and to control the radio transmitter, including activation and deactivation the transmitter, place the transmitter in power saving mode, as well as set the frequency and power level for the transmitted direction-finding signal.

The object of the direction-finding unit 150 is to obtain information concerning the main unit's geographical position in an alarm situation. In addition to the determination of position data that may be offered in the mobile communication network 400, the transmission of a radio signal from the direction-finding transmitter will supply further information on the geographical position of the main unit, by means of known per se radio direction-finding equipment.

The microcontroller 110 is further connected to an activation device 120, which in its simplest form is an electric switch of the push-button type. The microcontroller 110 is arranged in such a manner that an alarm situation

should be considered to be initiated as a result of the activation body being operated in a more closely specified manner.

The microcontroller 110 is further connected to an answering device 122, which also in its simplest form is an electrical switch of the push-button type. Operation of the answering device 122 involves accepting an incoming call from a caller, preferably a security/alarm centre. Operation of the answering device 122 may also involve triggering a so-called "keep alive" function, which will be described later.

The microcontroller 110 is further connected to a set of indicators 124. This comprises two optical indicators such as a first and a second light emitting diode, where the first is an indicator for indicating low battery level, while the second is an indicator for indicating that the mobile communication unit 130 has no connection with the network 400.

The microcontroller 110 is further connected to an audio unit 160. The audio unit gives the user the opportunity of holding a conversation with the security/alarm centre, usually by means of a "hands free" function. The audio unit 160 comprises a loudspeaker, a microphone and adaptation circuits for these.

The microcontroller 110 is further connected to a power supply unit 180, comprising a chargeable battery that can be charged from the base unit 300 via the connector 390.

If an alarm situation arises, the microcontroller 110 is arranged to establish a communication connection with the central unit 600. The microcontroller comprises a memory area containing the telephone number or numbers that should be called in such a situation.

The microcontroller 110 is further arranged to establish an alternative communication connection with a second communication terminal, if, in the event of an alarm situation, it does not succeed in establishing the above-mentioned communication connection with the central unit 600. The microcontroller comprises a memory area containing the telephone number or numbers that should be called in this situation.

In addition, if an alarm situation arises, the microcontroller is arranged to transmit a digital message such as an SMS message to the central unit 600 or

a second communication terminal connected to the network 400. The microcontroller comprises memory areas containing the telephone number or numbers to which a message should be sent in such a situation.

The mobile communication unit 130 can be called from an external, calling party. This is done by a call being established in the mobile communication network 400 to the communication unit 130 from the calling party by means of a communication terminal connected to the network. This terminal may be a mobile telephone operating directly in the network 400, a fixed telephone operating in a fixed network connected to the network 400, or a computer connected to the network 400 via modem equipment, such as the central unit 600 illustrated in fig. 1. The microcontroller 110 is arranged to input from the mobile communication unit 130 identification data identifying the calling party, and to derive an identity for the calling party from these identification data. This identity preferably comprises the calling party's telephone number.

The microcontroller 110 is further arranged to compare the calling party's identity with a list of stored, acceptable identities, and to decide whether the calling party is included in the list.

The microcontroller 110 is arranged to receive data in the form of digital messages from the mobile communication network 400. If the network 400 is a GSM network, these messages are usually SMS messages.

The microcontroller 110 is further arranged to derive the message sender's identity from the received digital message.

The microcontroller 110 is further arranged to compare the message sender's identity with a list of stored, acceptable identities, and to decide whether the sender is included in the list.

The microcontroller 110 is further arranged to use data that are received in such messages in order to set the microcontroller's functions, to change stored parameters or to execute commands immediately.

More specifically, the microcontroller 110 is arranged to interpret a received message, and to decide whether the message represents a configuration or a command. A configuration will change one or more of the settings stored in the programmable memory (EEPROM). A command, on the other hand, will be executed immediately, and represents no permanent change of settings.

An example of a command via a received message is a change of transmitting frequency during direction-finding. On receiving such a command the microcontroller 110 will change the direction-finding transmitter's frequency immediately. The next time a direction-finding operation is initiated, the direction-finding transmitter will return to its original frequency.

A second example of a command via a received message is activation or deactivation of the direction-finding unit 150. For this purpose the microcontroller 110 is arranged to instantly activate or deactivate the direction-finding unit 150 in response to a received message.

A further example of a command via a received message is a request for an acknowledgement action from the user. For this purpose the microcontroller 110 is arranged to indicate to the user that the answering body 122 should be operated. The operation should be implemented according to a predetermined pattern or plan. Should such an acknowledgement fail to appear, or the operation is performed in the wrong way compared with the predetermined plan, an alarm situation should be considered to have arisen. This activation, where a predetermined positive action is required from the user in order to avoid an alarm situation from being considered to have arisen, is called a "keep alive" function.

An example of configuration via a received message is a change of the above-mentioned list of acceptable caller identities, i.e. the list containing identification data, particularly telephone numbers of the parties who should be accepted as calling parties. For this purpose the microcontroller 110 is arranged to update or change the content of this list on the basis of data received in a message.

A second example of configuration is a change of the telephone number to be called in the event of an alarm. To achieve this, the microcontroller 110 is arranged, in response to a received message, to change the content of the register containing the telephone number or numbers that should be called in the event of an alarm situation.

A further example of configuration is change of the condition for an alarm situation to be considered to have arisen. An activation signal may either be emitted from the activation device 120 in the main unit, or it may be emitted from the activation device 220 in the remote trigger unit 200 and

subsequently transferred to the main unit 100 via local communication. The microcontroller 110 is arranged to execute a function expressing whether an alarm situation should be considered to have arisen on the basis of this activation signal. In order to achieve the said change of the condition for an alarm situation to be considered to have arisen, the microcontroller 110 is also arranged to change the above-mentioned function.

A further example of configuration is change of the signal form that should be given to the user on request for an acknowledgement action (the "keep alive" function). For this purpose the microcontroller 110 is arranged to choose whether the signal should be emitted visually by one of the indicators 124, or with sound via the audio unit 160, or whether alternatively or in addition the signal should be passed on via the local communication to the remote trigger means 200, where it produces an audible or tangible warning signal emitted by a warning device 270, which will be discussed with reference to fig. 3.

A further example of configuration is change of parameters employed in connection with the "keep alive" function, such as maximum time permitted before the absence of an acknowledgement action triggers the alarm, and details in the plan or pattern for operation of the answering device 122 which must be followed when performing the acknowledgement action.

Alternatively or in addition, the microcontroller 110 is arranged to configure all the parameters in a standard setting (factory default).

Fig. 3 illustrates a block diagram of the principle construction of a remote trigger unit 200.

Centrally located in the remote trigger unit 200 is a processing unit 210 in the form of a microcontroller.

Like the microcontroller 110 in the main unit, this microcontroller 210 consists of a microprocessor, a memory and input/output circuits. The memory here also comprises a program memory in ROM/Flash, RAM and EEPROM, in the same way as described in the section on the microcontroller 110. The microcontroller 210 may be a standard electronic component, but program code contained in the program memory, and thereby the mode of operation of the microcontroller 210, will be characteristic for the invention.

The microcontroller 210 is connected to a local communication unit 240 in the form of a radio transceiver that is suitable for use together with the local communication unit 140 in the main unit 100. The local communication unit 240 is therefore also preferably a transceiver module based on the Bluetooth standard.

The microcontroller 210 is further connected to an activation device 220. In its simplest form the activation device 220 is an electric switch of the push-button type. The microcontroller 210 is arranged to initiate an alarm situation as a result of the activation device being operated in a more closely specified manner.

The microcontroller 210 is further connected to an answering device 222, which in its simplest form is also an electrical switch of the push-button type. Operation of the answering device 222 involves accepting an incoming call from a caller, preferably a security/alarm centre. Operation of the answering device 222 may also involve triggering the "keep alive" function.

The activation device 220 and the answering device 222 have the same functions as the activation device 120 and the answering device 122 respectively in the main unit 100. The remote trigger means 200 is arranged to duplicate these functions cordlessly by means of the local communication between the remote trigger unit 200 and the main unit 100.

A microphone 260 may be connected to an input circuit for the microcontroller 210. In this case the microcontroller 210 is arranged to process an audio signal, particularly a voice signal, from the microphone 260, and to pass on a signal derived by the audio signal to the local communication unit 240. The remote trigger unit 200 is arranged to duplicate the microphone function in the main unit 100 cordlessly, by means of the local communication between the remote trigger unit 200 and the main unit 100.

The microcontroller 210 is arranged to emit a warning signal to a warning device 270. The warning body 270 may be a sound generator such as a loudspeaker, and/or a vibration generator, which by means of a vibrating material emits a tangible, but almost soundless vibration signal. The microcontroller 270 is arranged, on the basis of a signal received from the

local communication unit 240, to choose whether the sound generator and/or the vibration generator should be employed for warning purposes.

The power supply unit 280 comprises a battery that supplies the necessary electric power to the power-consuming elements in the remote trigger unit 200.

Fig. 4 illustrates a block diagram of the principle construction of a base unit 300.

The base unit 300 comprises a power supply unit 310. In an embodiment the power supply unit constitutes only a single electrical connection from an external power supply/charging unit, which can be connected to the base unit via a cable. The power supply unit 310 may comprise a power supply arranged to convert AC voltage/current from the mains to a DC voltage/current that can supply the main unit with electric power. The power supply is preferably composed of a charging unit that also controls the supplied voltage and/or current with a view to charging a battery in the main unit 100.

The base unit further comprises a loudspeaker unit 320. This may be employed for playback of audio signals generated by the main unit 100 when it is mounted in the base unit 300. The loudspeaker also preferably comprises an audio amplifier.

An electrical connector 390 contains at least the electrical connections necessary for connecting electric supply voltage to the main unit 300 and to retrieve an audio signal from the main unit 300.

The invention is described above by means of an embodiment, with the additional mention of individual alternatives.

In the embodiment the mobile communication network 400 is a GSM network. It will be appreciated that other types of mobile communication may be employed such as GPRS or UMTS. In this case the mobile communication unit 130 will be adapted to the network 400 concerned.

Instead of GSM type SMS messages, the messages employed for transferring data through the mobile communication network 400 may be provided by other types of message services that are available in the network 400 concerned.

The local communication network 500 is particularly indicated as being a Bluetooth network, but it should be understood that it could be any kind of network for data communication over shorter distances (up to approximately 100 m), whether it be radio-based, optical (particularly IR) or acoustic (ultrasound).

In the example it is stated that the main unit 100 has an activation device 120 for the user's activation of an alarm, and an answering device 122 for the user's submission of an acknowledgement action. It should be understood that these devices should be regarded as logic elements, which may be physically comprised of one and the same operating device.

Similarly, it is stated that the remote trigger means 200 comprises an activation device 220 and an answering device 220. These should also be regarded as logic elements, which may be physically comprised of one and the same operating device.

Those skilled in the art will realise that several possible embodiments and areas of application lie within the scope of the invention as it is defined by the features indicated in the following claims and by their equivalents.

PATENT CLAIMS

1. A main unit (100) for a security alarm for establishing communication between a user of the security alarm and an external central unit (600), which is connected to a mobile communication network (400), which main unit comprises

- a processing unit (110), connected to
- an audio unit (160) for inputting and emitting voice signals,
- an activation device (120), and
- a mobile communication unit (130), arranged, on operation of the activation device, to initiate an alarm situation, including establishing a two-way communication connection between the main unit (100) and the external central unit (600),

characterised in that

- the processing unit (110) is arranged to perform the following tasks;
- to keep stored in a memory configuration data indicating the connection between the conditions for an alarm situation to be considered to have arisen, and the actions that should be carried out in the event of an alarm situation,
- to receive a digital message from the mobile communication network (400) via the mobile communication unit (130), and
- on the basis of the digital message to modify the stored configuration data.

2. A main unit (100) for a security alarm according to claim 1,

- where a memory area in the processing unit (110) comprises a list of acceptable caller identities, and
- where the said modification involves changing the said list of acceptable caller identities.

3. A main unit (100) for a security alarm according to claim 1 or 2,

- where a memory area in the processing unit (110) comprises a list of identities that should be called in the event of an alarm situation, and
- where the said modification involves changing the said list of identities that should be called in the event of an alarm situation.

4. A main unit (100) for a security alarm according to one of the claims 1-3,

where the processing unit (110) is also arranged to execute a command on the

basis of the received digital message from the mobile communication network (400).

5. A main unit (100) for a security alarm according to claim 4, where the microcontroller (110) is further connected to a direction-finding unit (150) arranged to transmit a radio signal, and where the said command involves controlling the direction-finding unit (150).

6. A main unit for a security alarm according to claim 4, where the said command involves indicating a request for an acknowledgement action from a user.

7. A main unit for a security alarm according to one of the above claims, where the microcontroller (110) is further connected to a manually operated answering device (122), and where the microcontroller (110) is arranged so that an alarm situation should be considered to have arisen if the answering device is not operated according to a predetermined plan.

8. A main unit for a security alarm according to one of the above claims, which main unit also comprises a local communication unit (140), arranged to provide cordless local communication with a remote trigger unit (200).

9. A security alarm, characterised in that it comprises

- a main unit (100) according to claim 8 and
- a remote trigger unit (200), arranged to provide cordless local communication with the main unit (100).

10. A security alarm according to claim 9, where the remote trigger unit comprises an activation device (220), which by means of the local communication duplicates the function of the activation device (120) in the main unit (100).

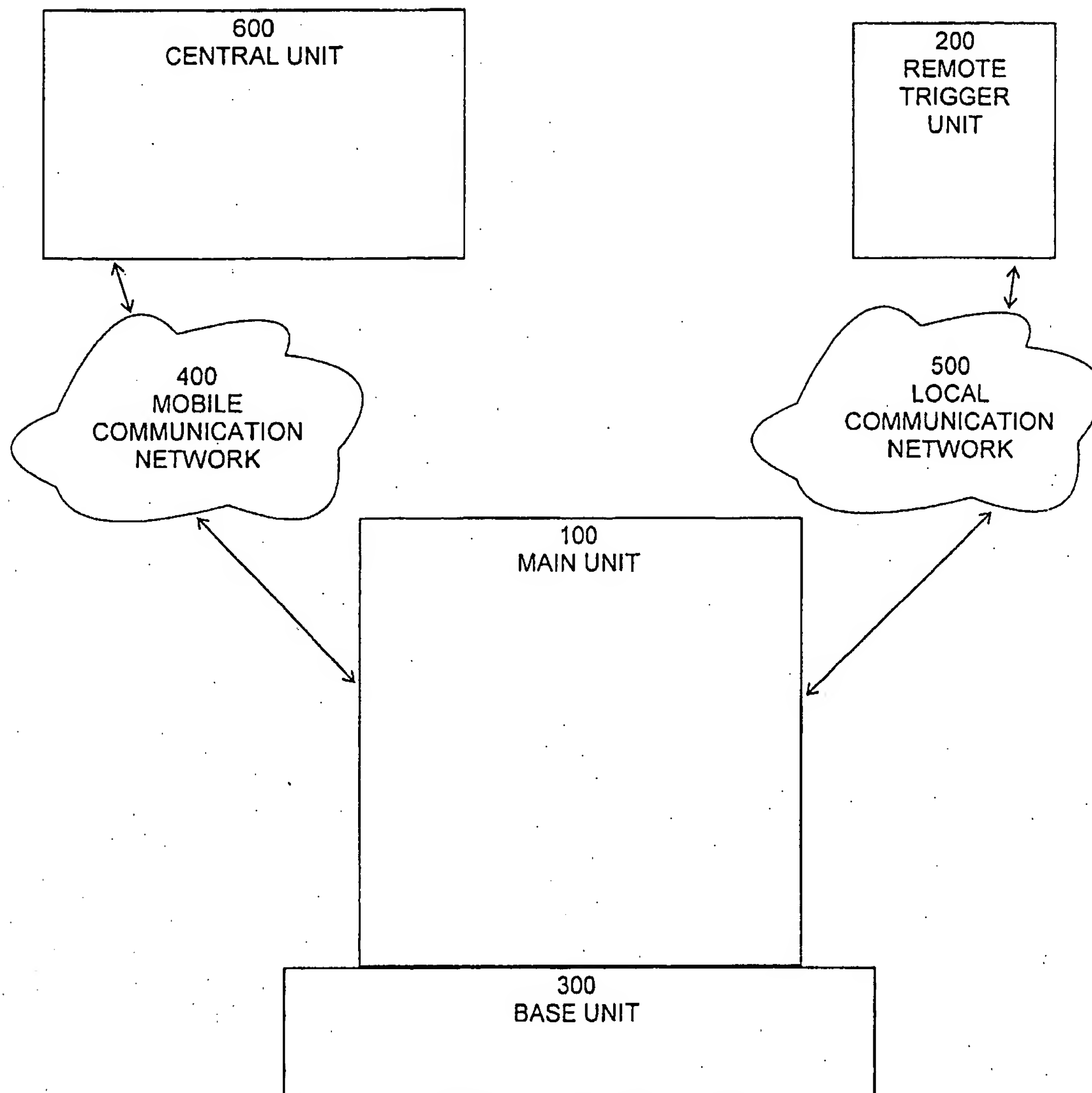


Fig. 1

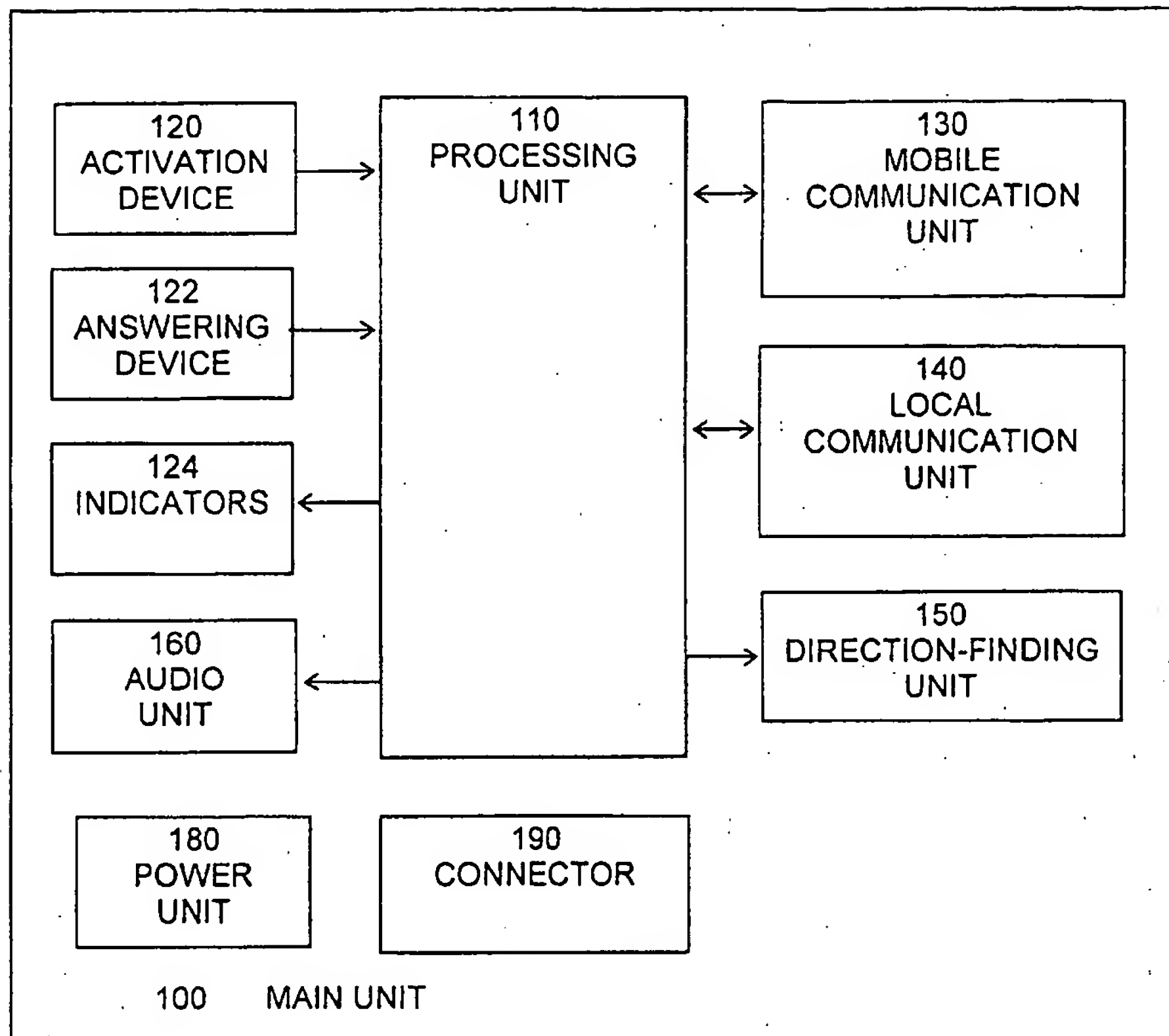


Fig. 2

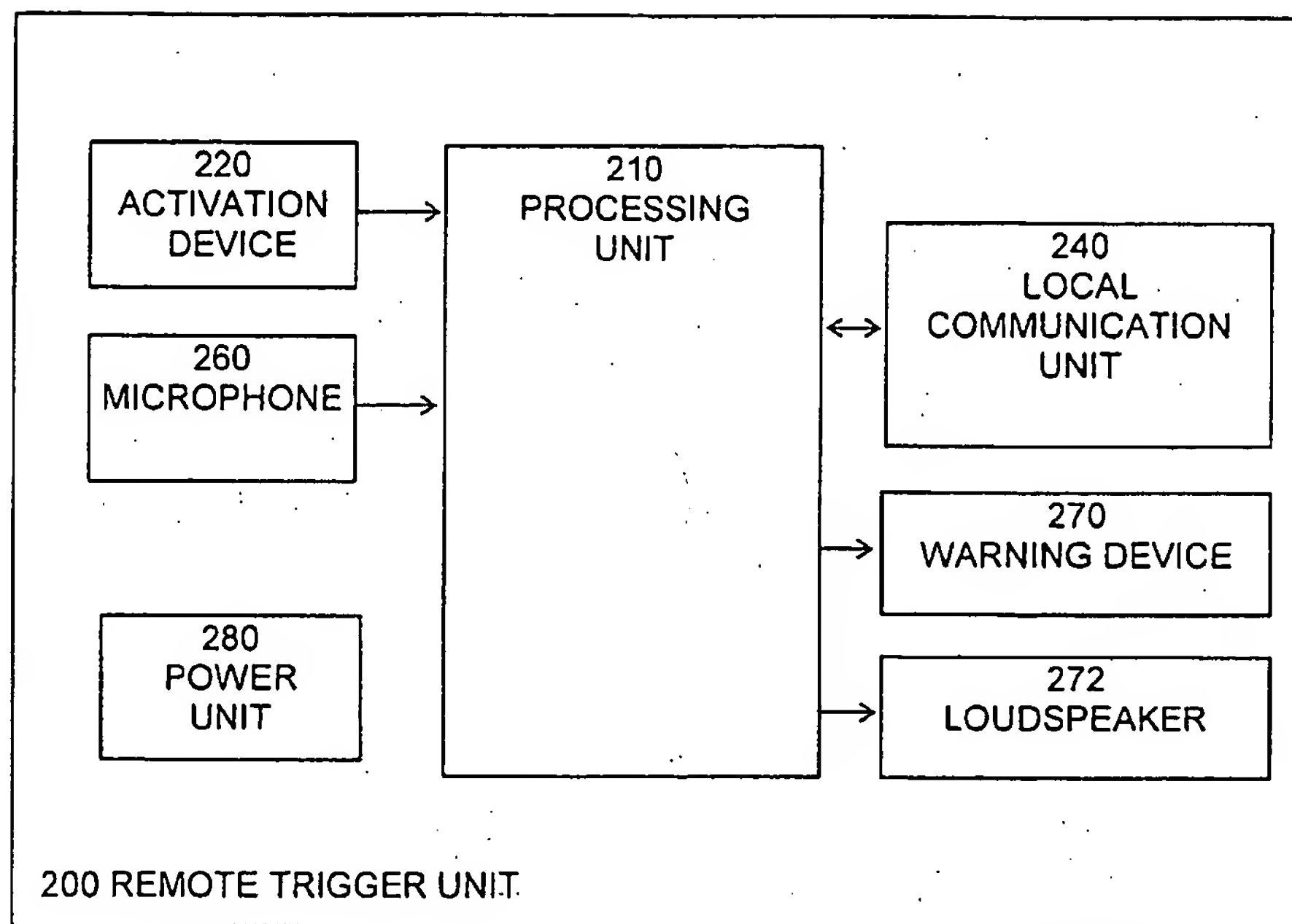


Fig. 3

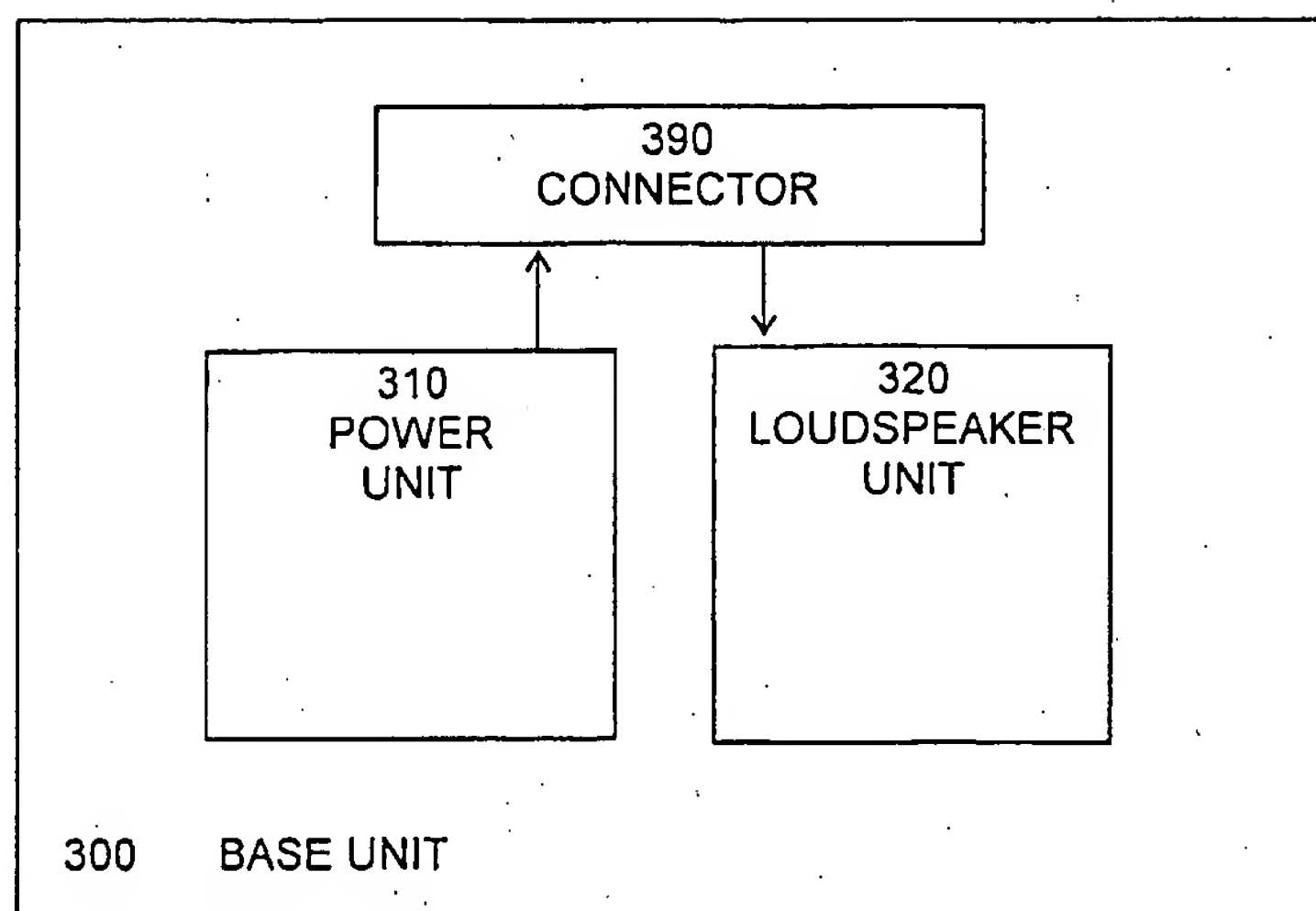


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 02/00147

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G08B 25/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| X | US 6032036 A (JEAN-LOUIS MAYSTRE ET AL.), 29 February 2000 (29.02.00), column 4, line 29 - line 45, abstract, claims | 1-4,6-10 |
| Y | -- | 5 |
| X | US 5808564 A (JAMES ROBERT SIMMS ET AL.), 15 Sept 1998 (15.09.98), see the whole document | 1-4,6-10 |
| Y | -- | 5 |
| Y | US 5945947 A (DAVID C. CUNNINGHAM), 31 August 1999 (31.08.99), abstract | 5 |
| | -- | |

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier application or patent but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

& document member of the same patent family

Date of the actual completion of the international search

29 July 2002

Date of mailing of the international search report

02-08-2002

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Göran Magnusson/AE
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 02/00147

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| A | US 6185410 B1 (TED R. GREENE), 6 February 2001 (06.02.01), see the whole document -- | 1-10 |
| A | US 5305370 A (LLOYD KEARNS ET AL.), 19 April 1994 (19.04.94), abstract -- | 1-10 |
| A | US 5838237 A (GRAEME CHARLES REVELL ET AL.), 17 November 1998 (17.11.98), see the whole document -- ----- | 1-10 |

INTERNATIONAL SEARCH REPORT
Information on patent family members

06/07/02

International application No.

PCT/NO 02/00147

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|--|--|
| US 6032036 A | 29/02/00 | NONE | |
| US 5808564 A | 15/09/98 | CA 2129425 A EP 0626088 A US 5334974 A WO 9316452 A | 07/08/93 30/11/94 02/08/94 19/08/93 |
| US 5945947 A | 31/08/99 | NONE | |
| US 6185410 B1 | 06/02/01 | NONE | |
| US 5305370 A | 19/04/94 | NONE | |
| US 5838237 A | 17/11/98 | NONE | |